

**International Lake Superior
Board of Control**

**Semi-Annual Progress Report to the
International Joint Commission**

Covering the Period October 1, 1998 to March 18, 1999



Table of Contents

Section	Page
1. Highlights	1
2. Monitoring of Hydrologic Conditions	1
3. Regulation of the Outflow from Lake Superior	2
4. Governing Conditions During the Reporting period	3
5. Maintenance and Repairs at the Compensating Works	3
6. Repairs and Maintenance at the Hydropower Facilities	3
7. Water usage in the St. Marys River	3
8. Long Lac and Ogoki Diversions	4
9. Annual Meeting with the Public and Public Information	4
10. International Great Lakes Coalition Regulation Proposal	5
11. Board Membership and Meetings	5

Figures

Figure 1: Lake Superior and Lake Michigan-Huron Monthly Levels

Figure 2: Lake Superior and Lake Michigan-Huron Basin Monthly Precipitation

Figure 3: Lake Superior and Lake Michigan-Huron Net Basin Supply

Tables

Table 1: 1998 -1999 Lake Superior Hydrologic Factors

Table 2: 1998 -1999 Lake Michigan-Huron Hydrologic Factors

Table 3: Monthly Distribution of Lake Superior Outflow (Metric Units)

Table 4: Monthly Distribution of Lake Superior Outflow (Customary Units)

Front Cover:

View of ice in the St. Marys Rapids looking westerly towards the Compensating Works.
(Photo courtesy of Carmen Paris, Soo Area Office, Sault Ste. Marie, MI)

International Lake Superior Board of Control



United States

BG Hans A. Van Winkle, Member
John W. Kangas, Secretary

Canada

Doug Cuthbert, Member
Peter P. Yee, Secretary

March 18, 1999

International Joint Commission
Washington, D.C.
Ottawa, Ontario

Commissioners:

This semi-annual report covers the Board's activities from October 1, 1998 to March 18, 1999.

1. Highlights

Lake Superior levels declined significantly in the reporting period and fell below chart datum beginning in December. Water supplies to Lake Superior were consistently well below average from April through October 1998 and have only been marginally above average since then. Outflows from Lake Superior have been at the minimum specified by Plan 1977-A since September. The low supplies, and resulting low Lake Superior levels and outflows, have caused concern among shipping and hydropower interests.

Lakes Michigan-Huron levels also declined markedly in the reporting period in response to nine consecutive months of well below average water supplies from April to December 1998. However, because these lakes were well above average at the start of this dry period their level is now only 12 centimetres (about 5 inches) below average and well above chart datum.

2. Monitoring of Hydrologic Conditions

During the reporting period, the Board, through its Regulation Representatives and On-Site Representatives, continuously monitored the water levels of Lakes Superior and Michigan-Huron, and the water levels and flows in the St. Marys River. The Regulation Representatives' monthly reports to the Board provided a hydrologic assessment, as well as recommendations on the regulation of outflows from Lake Superior. These reports also indicated the amount of water available for hydropower purposes, after the requirements for domestic use, navigation, and the fishery (St. Marys Rapids) were met.

Tables 1 and 2 list the recent monthly water levels, net basin supplies, and outflows for Lakes Superior and Michigan-Huron, respectively. Figure 1 compares the monthly water levels for this period to long-term averages and extremes. Figure 2 shows the monthly precipitation over the Lakes Superior and Michigan-Huron basins. Figure 3 shows the monthly net basin supply comparisons.

Except for September, precipitation over the Lake Superior basin was at or above average for each of the past six months. After the very warm and dry summer on the Lake Superior basin, water supplies remained below average in September, October, December and January. Supplies were above average in November and February. A survey of the Lake Superior basin at the end of February indicated that snow water equivalent was below average.

Precipitation over the Lakes Michigan-Huron basin was near or below average from April through December 1998. Precipitation was above average in January and February, significantly so in January. The average water supply to the Lakes Michigan-Huron basin from April through December 1998 set a new record low for that nine month period. Water supplies to these lakes in January were greater than average for the first time since last March. The February supply was also above average.

At the start of this reporting period Lake Superior levels were declining and they have continued to decline throughout the reporting period. They passed below chart datum of 183.2 m (601.1 ft) on December 14, 1998. Lake Superior's levels have ranged from 23 cm to 32 cm (about 9 - 13 inches) below average for the last six months. On March 18, Lake Superior was at elevation 183.07 m (600.62 ft), 19 cm (about 7 inches) below average and 20 cm (about 8 inches) lower than one year ago.

Similarly, at the start of this reporting period Lakes Michigan-Huron levels, while above average, were declining. Levels fell below average in November and continued to decline reaching a low of 176.22 m (578.14 ft) on March 17, 1999. Lakes Michigan-Huron levels ranged from 5 cm (about 2 inches) above to 14 cm (about 6 inches) below average during the reporting period, but remained above chart datum. On March 18, Lakes Michigan-Huron was at elevation 176.24 m (578.22 ft), 12 cm (about 5 inches) below average and 46 cm (about 18 inches) lower than one year ago.

3. Regulation of the Outflow from Lake Superior

During the reporting period, the outflows of Lake Superior have been at the Plan 1977-A minimum of 1,560 m³/s (55.1 tcf/s). Note that 1560 m³/s is the minimum outflow that can be specified by Plan 1977-A, unless levels decline to below 182.96 m on Lake Superior, at which point lower flows in accordance with criterion c would govern. The gate open setting for the main portion of the St. Marys Rapids was an equivalent one-half open setting throughout the reporting period. Gate 1, which supplies water to the Fishery Remedial Works, remained set at 15 m³/s (530 cfs).

During the reporting period, the operators and owners of the Compensating Works complied with all Board requests concerning gate open settings.

4. Governing Conditions During the Reporting Period

The monthly mean levels of Lake Superior during the reporting period were within the limits of 182.76 and 183.86 meters (599.6 and 603.2 feet) specified in the Commission's Orders of Approval.

During the reporting period, the daily mean water levels in the lower St. Marys River at the U.S. Slip Gage downstream of the U.S. Lock, varied between elevations 176.96 m and 176.46 m (580.58 and 578.94 feet). Thus the requirement for maintaining the river level at that location below 177.94 meters (583.8 feet) was satisfied.

5. Maintenance and Repairs at the Compensating Works

Repairs to the Compensating Works were completed in September 1998, thus concluding the rehabilitation program which started in 1995.

An underwater video inspection of the U.S. portion of the Compensating Works structure and the U.S. Government hydropower plant spillway area is scheduled for this spring after the ice has moved out. The purpose is to verify the integrity of the repairs to the structure. A 5-year major inspection of the structure, last completed in 1995, is scheduled for the year 2000.

6. Repairs and Maintenance at the Hydropower Facilities

No major repair work to the three hydropower plants occurred during the reporting period. Y2K compliance is a concern with regard to equipment and systems associated with the outflow regulation. The U.S. Government, Great Lakes Power Limited, and Edison Sault Electric Co. power plants as well as the offices of the U.S. and Canadian Regulation Representatives have reported that they are in compliance, or will meet compliance requirements.

7. Water Usage in the St. Marys River

Table 3 (Table 4 in U.S. Customary Units) lists the distribution of the outflows from Lake Superior for January 1998 through February 1999. Water uses are divided into four categories: domestic, navigation, fishery, and hydropower. According to the 1979 Supplementary Order, after the first three water requirements are satisfied, the remaining outflow from Lake Superior is shared equally between the U.S. and Canada for hydropower purposes. Any remaining flow allotment, beyond the discharge capacity of the hydropower plants, is normally discharged through the Compensating Works into the St. Marys Rapids.

As shown in the tables, the amount of water used for domestic purposes averaged about 5.0 m³/s (180 cfs).

The amount required for navigation lockage depended on traffic volume and varied from 1.4 to 11.9 m³/s (50 to 420 cfs). The U.S. locks were closed on January 15, 1999 and are expected to open on March 25, 1999. The Canadian lock reopened on July 14, 1998 after completion of a major reconstruction program. It had been closed since July 27, 1987 as the result of a major structural failure in the southwest wall. The lock closed for the season on October 7, 1998 and is expected to reopen in mid-May 1999.

In accordance with the Commission's Orders to fulfill the fishery needs in the Rapids, a minimum Compensating Works gate setting of one-half gate open, or its equivalent, is required at all times. In addition, a flow of at least 15 m³/s (530 cfs) in the Fishery Remedial Works (through Gate 1) must be maintained. During the reporting period, a setting equivalent to one-half gate open was maintained in the Compensating Works. The flow in the St. Marys Rapids, including that through the Fishery Remedial Works, averaged about 97 m³/s (3430 cfs) for the reporting period. Gate 1 has been set at 15 m³/s (530 cfs). This setting is expected to continue.

Due to near minimum Lake Superior outflows throughout the reporting period, flows at the power plants continued to be well below their capacities.

In 1995 a report to the Board recommended conducting annual inspections of the water level gauges used to determine the operating head at the plants, and periodic flow measurements to check the plants' ratings. On August 25 and 26, the Board's technical staff visited the hydropower plants to collect data, inspect water level gages and meet with plant operators. Measurement of flows in the power canals also took place during August. A preliminary report has been prepared and will be submitted when final hydraulic data analysis and calculations are complete. Inspections are expected to be conducted on a periodic basis.

8. Long Lac and Ogoki Diversions

Ontario Hydro continued to provide the Board with information on the operations of the Long Lac and Ogoki Diversions. The Ogoki Diversions into Lake Nipigon (which flows into Lake Superior) averaged 83 m³/s (2930 cfs) from September 1998 through February 1999. The Long Lac Diversion averaged 31 m³/s (1100 cfs) for the same period. Combined, these diversions were about 83 percent of average for the period.

9. Annual Meeting with the Public and Public Information

The Board held its 1998 annual public meeting in South Haven, Michigan on June 23, 1998.

The Board continues to maintain a website on the Internet. Content includes information on Board members and responsibilities as well as copies of news releases, reports and hydrologic data summaries.

10. International Great Lakes Coalition Regulation Proposal

At the September 30, 1998 semi-annual Board meeting a proposed new regulation plan put forward by the International Great Lakes Coalition was discussed. While the Board agreed that resource constraints within the Regulation Representatives' offices prevent a detailed evaluation of the proposed plan, it was decided that the physical feasibility of the Coalition's plan needs to be reviewed prior to any further evaluation. Further work to review the plan will be dependent on available resources.

On November 23, 1998 representatives of the International Great Lakes Coalition presented staff of the Regulation Representatives offices from all three Great Lakes Boards of control, with a summary of their proposed regulation plan developed by Mr. John Boyd for the Coalition. The major feature of the Coalition's proposed regulation plan is the construction of a new control structure in the Niagara River and dredging to increase the outflow capacity from Lake Erie. With such further physical works, the Coalition proposes to lower the level regime of all of the Great Lakes but maintain the same approximate range in levels (ie. shift the present level regime downwards). Following that meeting a listing was prepared of the likely impacts of the Coalition's proposed regulation regime on each user/interest group in the Great Lakes. The Coalition contributed their views in the preparation of this subjective, qualitative review of the impacts. It was also explained to the Coalition that their proposed regulation scheme would require changes to the Commission's Orders of Approval and would have to satisfy the articles of the Boundary Waters Treaty.

11. Board Membership and Meetings

There was no change in the Board membership.

The Board met in New York, New York on March 18, 1999.

The 1999 annual public meeting will be held in Sault Ste. Marie, Ontario on July 6th.

Respectfully submitted,

/ S /

BG Hans A. Van Winkle
Member for United States

/ S /

Doug Cuthbert
Member for Canada

TABLE 1
1998 - 1999 Hydrologic Factors
Lake Superior

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded ¹		Difference From Average ²		Monthly Mean Recorded		Exceedance Probability (%)	Monthly Mean Recorded		Percent of Average ³ (%)
	Meters	Feet	Meters	Feet	m ³ /s	tcfs		m ³ /s	tcfs	
Jan-98	183.40	601.71	0.04	0.13	- 460	- 16	54	1820	64	94
Feb	183.34	601.51	0.04	0.13	460	16	39	1800	64	95
Mar	183.29	601.35	0.03	0.10	2230	79	22	1970	70	105
Apr	183.35	601.54	0.06	0.20	2210	78	93	1940	69	99
May	183.34	601.51	- 0.05	- 0.16	2600	92	95	2030	72	96
Jun	183.39	601.67	- 0.08	- 0.26	3970	140	61	1800	64	82
Jul	183.41	601.74	- 0.13	- 0.43	820	29	> 99	1800	64	79
Aug	183.38	601.64	- 0.18	- 0.59	290	10	> 99	1590	56	67
Sep	183.33	601.48	- 0.24	- 0.79	- 370	- 13	96	1550	55	65
Oct	183.26	601.25	- 0.28	- 0.92	- 400	- 14	87	1560	55	68
Nov	183.21	601.08	- 0.29	- 0.95	770	27	37	1560	55	69
Dec-98	183.19	601.02	- 0.24	- 0.79	- 480	- 17	42	1560	55	75
Jan-99	183.12	600.79	- 0.24	- 0.79	- 460	- 16	53	1560	55	80
Feb	183.10	600.72	- 0.20	- 0.66	830	29	22	1560	55	82

Notes:

m³/s = cubic meters per second

tcfs = 1,000 cubic feet per second

1. Water levels are a mean of five gauges on Lake Superior, IGLD 1985.

2. Average levels are for the period 1918 - 1998, based on a mean of five gauges. Differences computed as meters and then converted to feet

3. Average flows are for the period 1900-1989.

TABLE 2
1998 - 1999 Hydrologic Factors
Lake Michigan - Huron

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded ¹		Difference From Average ²		Monthly Mean Recorded		Exceedance Probability (%)	Monthly Mean Recorded		Percent of Average ³
	Meters	Feet	Meters	Feet	m ³ /s	tcfs		m ³ /s	tcfs	
Jan-98	176.74	579.86	0.38	0.92	3750	132	8	5480	194	122
Feb	176.71	579.76	0.37	0.89	1950	69	63	5450	192	125
Mar	176.74	579.86	0.38	0.92	8970	317	7	5490	194	114
Apr	176.89	580.35	0.44	1.44	7380	261	60	5660	200	110
May	176.91	580.41	0.36	1.18	4610	163	87	5660	200	106
Jun	176.90	580.38	0.29	0.95	3970	140	85	5680	201	104
Jul	176.88	580.31	0.24	0.79	- 480	- 17	> 99	5700	201	103
Aug	176.80	580.05	0.18	0.59	930	33	63	5560	196	101
Sep	176.68	579.66	0.11	0.36	- 1670	- 59	91	5600	198	102
Oct	176.55	579.23	0.05	0.16	- 2280	- 81	91	5440	191	99
Nov	176.44	578.87	0.00	0.00	240	8	64	5280	186	98
Dec-98	176.36	578.61	- 0.04	- 0.13	- 1590	- 56	90	5240	185	101
Jan-99	176.27	578.31	- 0.09	- 0.30	2820	100	17	4290	151	96
Feb	176.28	578.35	- 0.06	- 0.20	2620	93	44	4980	176	114

Notes:

m³/s = cubic meters per second

tcfs = 1,000 cubic feet per second

1. Water levels are a mean of five gauges on Lake Superior, IGLD 1985.
2. Average levels are for the period 1918 - 1998, based on a mean of five gauges. Differences computed as meters and then converted to feet
3. Average flows are for the period 1900-1989.
4. Average flows are for the period 1900-1989.

TABLE 3
Monthly Distribution of Lake Superior Outflow
(Metric Units - Cubic Meters per Second)

Year & Month	Outflow in m ³ /s Through													Total Lake Superior Outflow
	Power Canals					Navigation Canals			Domestic Usage				Fishery	
	U.S. Gov't. Hydro	Edison Sault Electric Co.	U.S. Total	Great Lakes Power Limited	Total in Power Canals	United States	Canada	Total in Navi- ga- tion Canals	Sault Ste. Marie U.S. & Canada	Algoma Steel	St. Marys Paper	Total Domestic Usage	St. Marys Rapids	
Jan-98	366	489	855	853	1708	3.8	0.0	4	0.3	4.9	0.3	6	102	1820
Feb	368	480	848	844	1692	2.1	0.0	2	0.3	4.9	0.3	6	101	1801
Mar	354	570	924	939	1863	3.5	0.0	4	0.3	4.7	0.3	5	101	1973
Apr	363	550	913	915	1828	10.6	0.0	11	0.3	4.4	0.3	5	100	1944
May	359	595	954	957	1911	12.2	0.0	12	0.4	4.5	0.3	5	99	2027
Jun	364	465	829	846	1675	14.9	0.0	15	0.4	4.5	0.3	5	100	1795
Jul	361	463	824	840	1664	15.9	1.2	17	0.4	4.3	0.3	5	110	1796
Aug	358	369	727	735	1462	13.5	2.6	16	0.4	4.3	0.3	5	105	1588
Sep	359	358	717	711	1428	13.4	2.3	16	0.3	4.4	0.3	5	99	1548
Oct	365	359	724	719	1443	11.9	0.4	12	0.3	4.2	0.3	5	98	1558
Nov	366	361	727	722	1449	9.6	0.0	10	0.3	4.1	0.3	5	97	1561
Dec	365	364	729	724	1453	9.2	0.0	9	0.3	4.2	0.3	5	97	1564
Jan-99	356	376	732	728	1460	2.6	0.0	3	0.3	4.3	0.3	5	95	1563
Feb	363	370	733	731	1464	1.4	0.0	1	0.3	4.3	0.3	5	95	1565

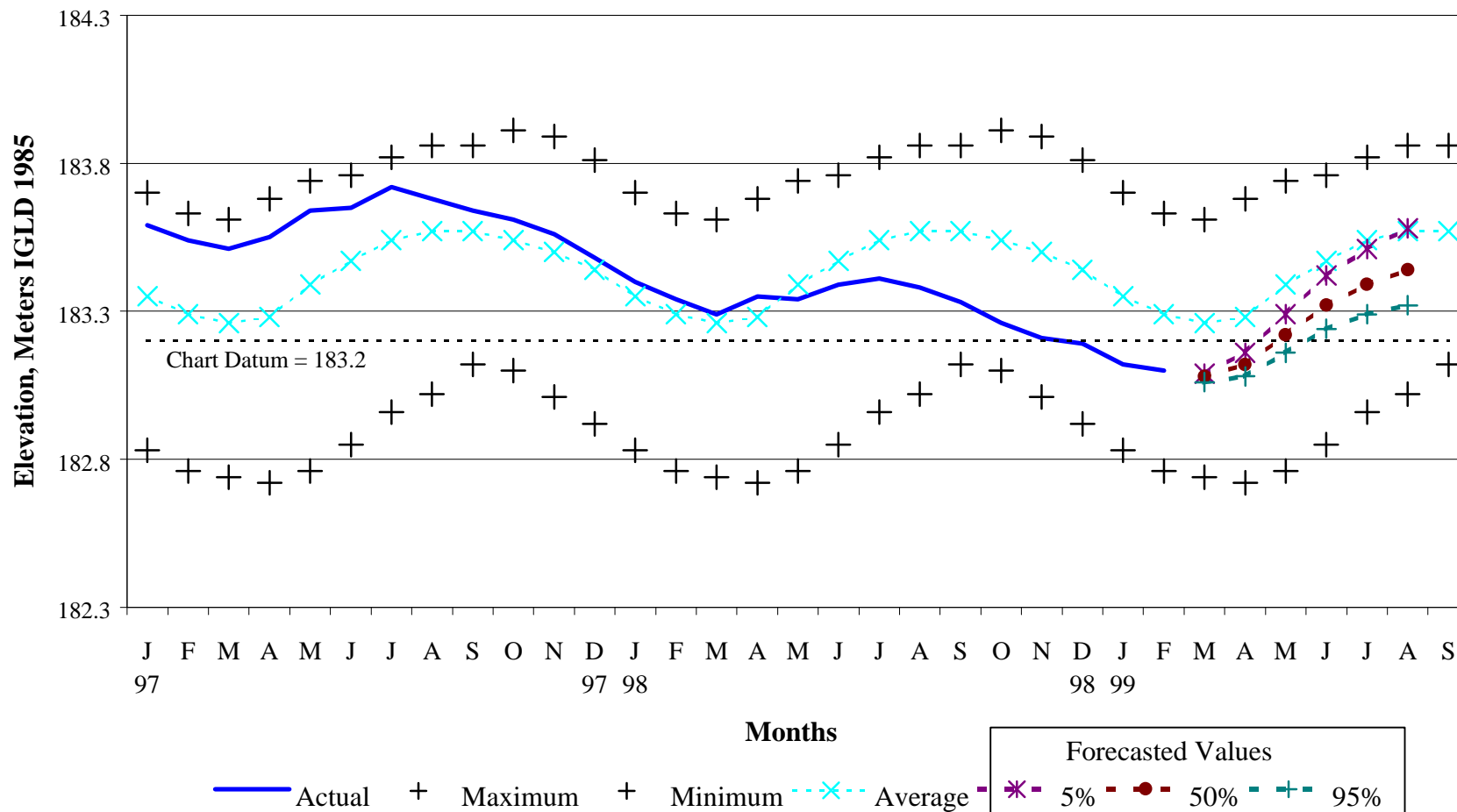
NOTE: POWER CANALS COLUMNS INCLUDE FLOWS THROUGH POWER PLANTS AND SPILLWAYS.

TABLE 4
Monthly Distribution of Lake Superior Outflow
(U.S. Customary Units - Cubic Feet per Second)

Year & Month	Outflow in CFS Through													Total Lake Superior Outflow
	Power Canals					Navigation Canals			Domestic Usage				Fishery	
	U.S. Gov't. Hydro	Edison Sault Electric Co.	U.S. Total	Great Lakes Power Limited	Total in Power Canals	United States	Canada	Total in Navi- ga- tion Canals	Sault Ste. Marie U.S. & Canada	Algoma Steel	St. Marys Paper	Total Domestic Usage	St. Marys Rapids	
Jan-98	12,900	17,300	30,200	30,100	60,300	134	0	134	11	173	11	195	3,600	64,200
Feb	13,000	17,000	30,000	29,800	59,800	74	0	74	11	173	11	195	3,570	63,600
Mar	12,500	20,100	32,600	33,200	65,800	124	0	124	11	166	11	188	3,570	69,700
Apr	12,800	19,400	32,200	32,300	64,500	374	0	374	11	155	11	177	3,530	68,600
May	12,700	21,000	33,700	33,800	67,500	431	0	431	14	159	11	184	3,500	71,600
n	12,900	16,400	29,300	29,900	59,200	526	0	526	14	159	11	184	3,530	63,400
Jul	12,700	16,400	29,100	29,700	58,800	562	42	604	14	152	11	177	3,880	63,500
Aug	12,600	13,000	25,600	26,000	51,600	477	92	569	11	152	11	174	3,710	56,100
Sep	12,700	12,600	25,300	25,100	50,400	473	81	554	11	155	11	177	3,500	54,600
Oct	12,900	12,700	25,600	25,400	51,000	420	14	434	11	148	11	170	3,460	55,100
Nov	12,900	12,700	25,600	25,500	51,100	339	0	339	11	145	11	167	3,430	55,000
Dec	12,900	12,900	25,800	25,600	51,400	325	0	325	11	148	11	170	3,430	55,300
Jan-99	12,600	13,300	25,900	25,700	51,600	92	0	92	11	152	11	174	3,350	55,200
Feb	12,800	13,100	25,900	25,800	51,700	49	0	49	11	152	11	174	3,350	55,300

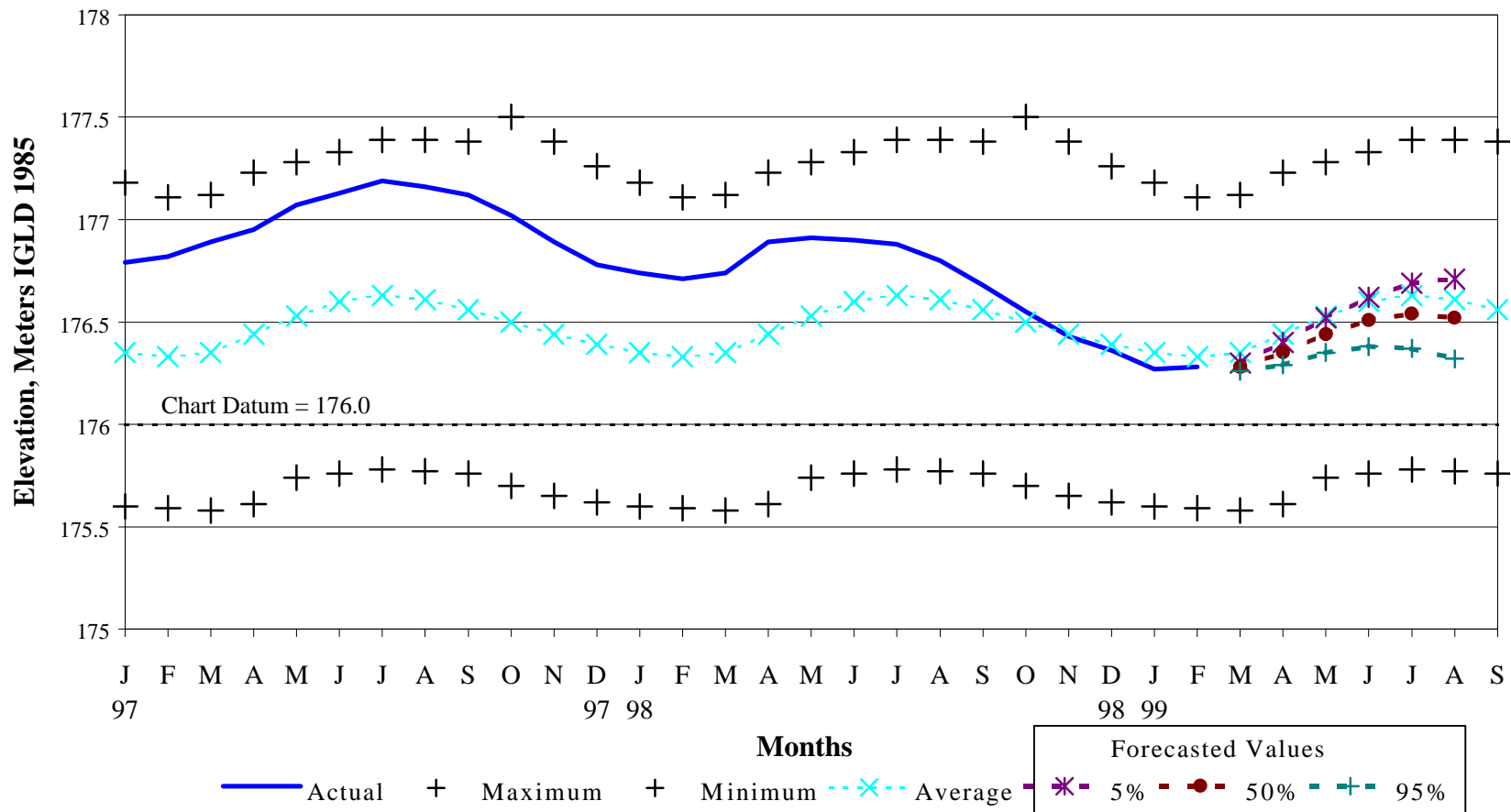
NOTE: Flows for individual users were originally coordinated in m³/s, and are converted here to U.S. Customary units (cfs). Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.

Monthly Mean Water Levels Lake Superior



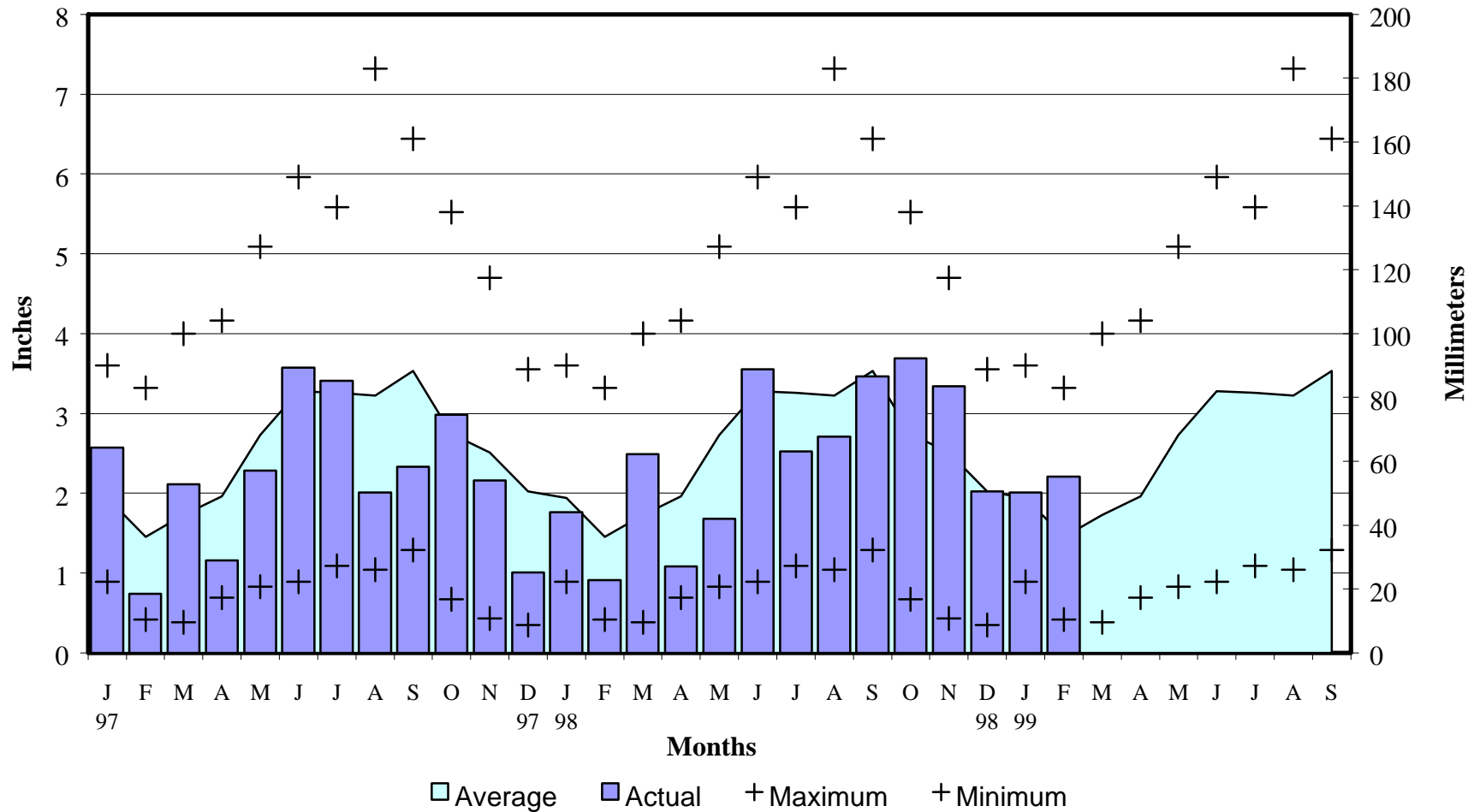
Based on a mean of 5 gages. Average, Maximum and Minimum values for the Period of Record 1918-1998

Monthly Mean Water Levels Lakes Michigan-Huron

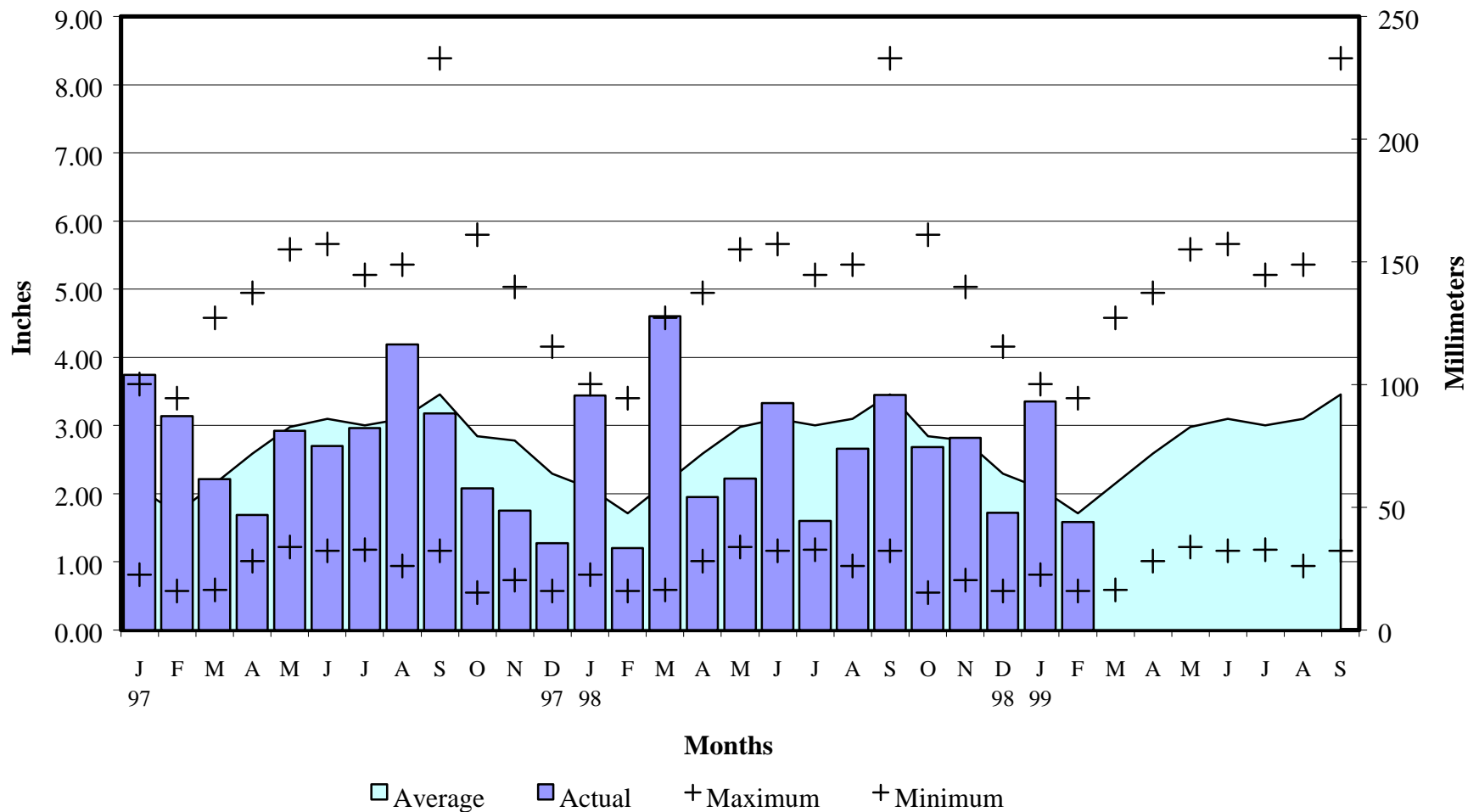


Based on a mean of 6 gages. Average, Maximum and Minimum values for the Period of Record 1918-1998

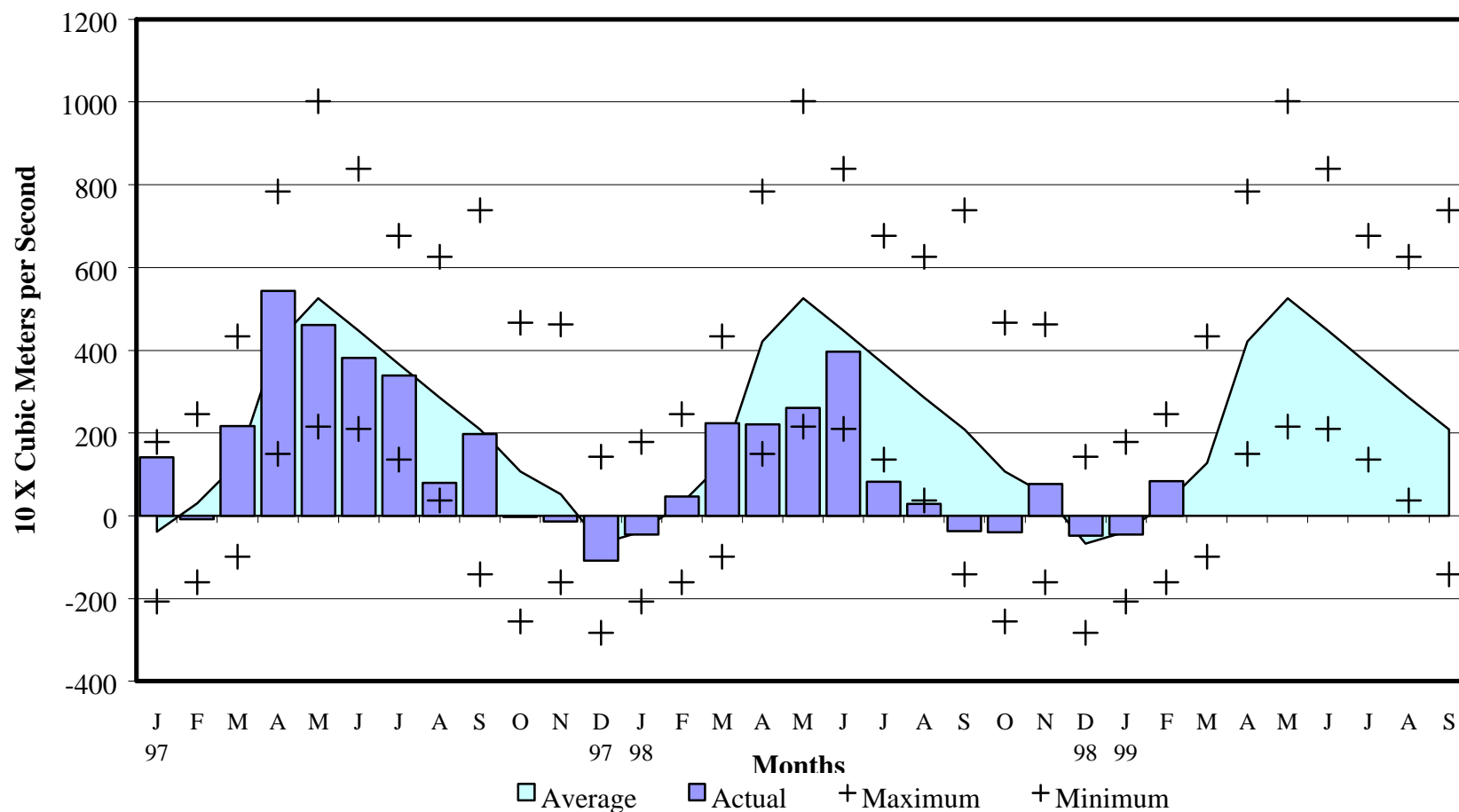
Monthly Precipitation Lake Superior



Monthly Precipitation Lakes Michigan-Huron

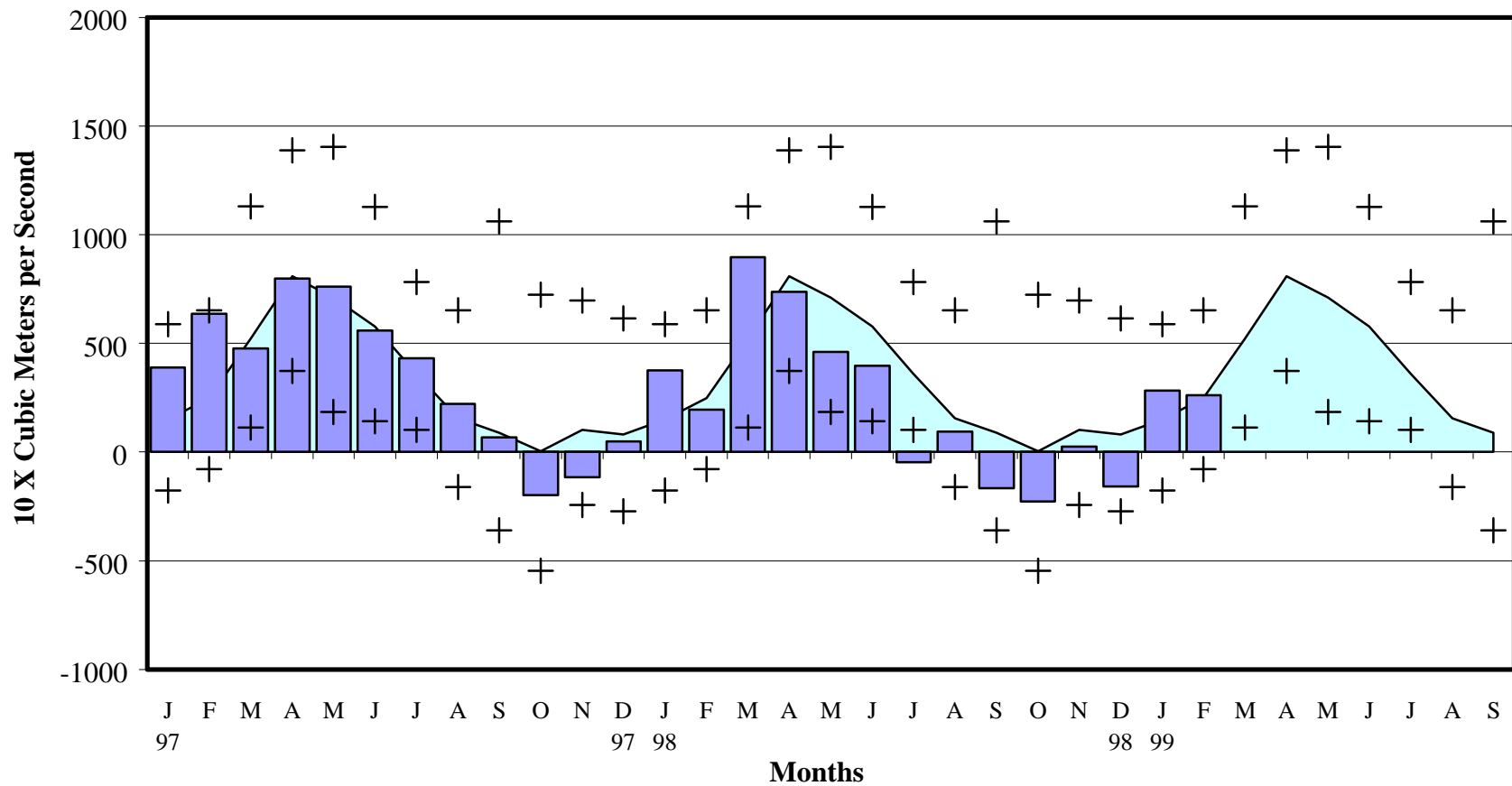


Monthly Net Basin Supplies Lake Superior



Average, Maximum and Minimum Based on Coordinated Period Of Record 1900-1989

Monthly Net Basin Supplies Lakes Michigan-Huron



□ Average ■ Actual + Maximum + Minimum

Average, Maximum, and Minimum Based on Coordinated period of Record 1900-1989